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Ecological Utilization Space: Operationalizing Sustainability

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Ever since "sustainability" was introduced as the main concept in the modern debate on environmental protection, it has been criticized for its vagueness. It needs to be made more "operational," the critics argue; otherwise it will end up as yet another fancy catchword with an indeterminate meaning. It is necessary to give it a more specific content in order to be able to use it in the decision-making process. We have to know exactly which restrictions it puts on our ambitions. This must be a case for neutral and value-free experts who can tell us in detail how far we can go before we overstep the line between sustainable and unsustainable ways of living. When this is settled, we can carry on with all the things we prefer to do within the specified limits.

In this chapter I will focus on one, or rather, as we will see later, two proposals on how to operationalize sustainability through the introduction of the so-called ecological utilization space. First, however, I will present a short version of a fairly well-known story about modern life. This story will set the stage for the demand for operationalization. It is an important story to tell, because it constitutes part of the basis on which many decisions are built, especially in relation to environmental questions.

Modern Life and Personal Free Scope

In modern societies we all, or at least many of us, find it important to preserve an appropriate degree of personal freedom or autonomy. We want to have a certain scope within which we can act in accordance with our own personal conception of the good life. We want to be able to dismiss forms of interference that we have not asked for and that we do

not find helpful and inspiring in our personal lives. Nobody else should be able to determine our personal priorities and life choices. This is our own business. We may all be seeking happiness and the good life, but we despise paternalistic individuals who intrude in our affairs and attempt to dictate how we should live our lives. We want to do things our own way.

Consequently, we are all keen on establishing and preserving individual rights of noninterference. Neither the central state nor our fellow citizens should be allowed to intrude in our lives against our will, nor should they have the right to require us to live in accordance with values and ideals that we do not share, or that we have not accepted voluntarily. We simply want them to stay off our backs. This is a two-way street, of course. As long as other people are not interfering with our lives, we will not interfere with theirs. They are allowed to have a free sphere, too, similar to our own, where they can act in accordance with their personal values and ideals. If we want to, we can combine our spheres of activity, form friendships and voluntary associations, and live a common life together with other people. We do not want to be forced into anything, however. We want to share our lives with the people we love and care for, or share values and ideals with, and nobody should be able to order us to do anything else. Nor will we order other people to live their lives in ways they would never choose for themselves.

In this sense, we see each other as equals, as human beings whose individual freedom, autonomy, or self-determination cannot be considered as just one more particular value among many others. It must be seen as a transcendental value, the impersonal prerequisite for all personal values. It is therefore overriding in comparison to all the specific values related to the particular conceptions of the good life. The protection of individual freedom always comes first. Nothing can overrule it, because no specific earthbound values can move upward into the transcendental realm, where the basic rules of the game are settled. Protection of the right, the moral law of noninterference, is always a prerequisite to the enhancement of any kind of good.

If no reasons can be given for deviations from equality in the transcendental realm of rights, individuals of future generations must be given the very same status as those in the present generation. It does not seem possible to state any impersonal reasons for granting special

privileges to individuals currently alive. Everybody must be treated as equals, no matter where or when they live. Like current individuals, future individuals ought to have their own free scope to act within in accordance with their personal ideals and values.

This is a very general outline of the story of modern life. It is not the full story, but it is a story with enough truth in it that it has set the agenda for many discussions about environmental regulation and environmental politics (as well as for many other kinds of discussions, of course). Many people are eager to find a way of dealing with environmental issues that does not force them to take a stand on questions of value (apart from the transcendental value of personal freedom), because value questions are seen as personal, difficult, and basically subjective matters. In this kind of setting "operationalization" is bound to become a critical term. Modern bureaucrats and state officials are looking for neutral and impersonal methods that make it possible to operationalize a concept like "sustainability," leaving all questions of value to be dealt with in the personal realm. They want to find a solution that is impersonal and neutral with respect to all the conflicting personal values and conceptions of the good.

In the English-speaking world, the effort to operationalize has mainly been interpreted in economic terms. I will return to this later. In various European countries, however, including my own country, Denmark, a new concept was introduced in the mid-1990s as another means of solving the problem of operationalization, the problem of remaining neutral with regard to values and conceptions of the good life: the idea of "ecological utilization space" (or "ecological scope," or "environmental space"). It is a bit difficult to trace the origin of the idea, but the German Wuppertal Institute has been one of its main promoters. The concept is closely related to various other older concepts like, for instance, "carrying capacity," which had been used by forestry economists for decades before it was adopted in various United Nations reports at least as far back as the early 1980s, the Dutch concept of "ecocapacity,"[1] and, beyond that, the Canadian idea of measuring "the ecological footprint."[2] Other sources could be acknowledged as well. In the discussion below, however, I will mainly be dealing with the definition of the concept used by the Danish Ministry of Environment and Energy, a definition fairly close to the one used in a report from the

Wuppertal Institute, sponsored by the European section of Friends of the Earth.

Ecological Utilization Space

Let us take a look, then, at these definitions. In the Wuppertal report the concept is introduced in the following way: "The amounts of energy, water, land, non-renewable resources and forests which can be used without reducing the possibilities of future generations is called the ecological utilization space." The report continues a little later: "Principles of equality and social justice are incorporated into the concept 'ecological utilization space per person' by distributing the permissible use of resources equally among everybody."[3] Both neutrality and equality are thus maintained in the definition. The distribution is based on simple equality, and concepts like "possibilities" and "uses" are employed in a way that leaves no trace of values.

Every fourth year the Danish Ministry of Environment and Energy publishes a broad exposition or statement of the results from the preceding years and of the plans for the years to follow. In the 1995 edition the concept of ecological utilization space was given a fairly prominent place. The definition of the concept was quite close to the one in the Wuppertal report: "The ecological utilization space [*økologisk råderum*] is defined—from a global point of view—as the amount of natural resources (air, water, land, minerals, energy sources, nature areas, plants, animals, and so on) that can be used per year without preventing future generations from having access to the same amount and quality. Every human being shall have a right to his or her part of the ecological utilization space." The statement then continues with the following sentence, which gives the concept a somewhat different meaning, and which I will return to later: "Everybody should have a chance to reach the level of material welfare that the ecological utilization space and the technological capacity allow."[4] In the first part of the definition we find the same insistence on equality as in the Wuppertal report, and even though the loaded term *quality* is applied, the standards against which the quality is to be evaluated are not made clear, so the neutrality demand cannot be said to have been violated.

One can, accordingly, find two basic points behind both approaches to the concept of ecological utilization space. The first is epistemological. It is assumed that politically neutral experts using value-free natural science methods can specify the ecological utilization space. In the Danish governmental exposition it is explicitly seen as a virtue of the concept that it defines "a possible way of operationalizing the environmental demands of sustainable development."[5] We need natural science to tell us exactly how far we can go before we begin to act unsustainably. It is like walking on the edge of a cliff on a foggy day: one wrong step and we fall, and only scientists can see where the edge really is through their instruments. Society is sustainable as long as it stays within the proper limits. If it moves beyond these limits, future generations will end up on a lower plateau with fewer resources where they have less free scope than present generations. This way it seems possible to avoid value questions. The only presumed value is the transcendental value of autonomy. Everybody can behave as they please, in accordance with their own personal values, as long as they stay within their own ecological space. This space is defined by natural scientists without reference to any particular conception of the good.

The second assumption is ethical. It states that the distribution of natural resources ought to be based on a principle of (simple) equality, because value-free, deontological ethics cannot discriminate between people. In the Wuppertal report this is stressed several times. It is a separate goal to secure "just and equal access to the resources for all human beings,"[6] now and in the future. The report refers explicitly to Kant's categorical imperative as the philosophical basis of the claim. The Danish exposition agrees on this point: each and every human being should have an equal right to his or her share of the ecological utilization space. We must leave the "same amount and quality" to future generations—a distant echo of the Lockean proviso to leave "enough and as good" for others, but not quite the same, as we shall see shortly. This is all very much in line with the story of modern life. If there is no common conception of the good, and if there is only a limited amount of goods or resources, it makes sense to say that we should supply each person, now and in the future, with an equal right to utilize the same amount of each and every kind of resource as everybody else.

Can the Limits of Sustainability Be Determined by Value-Free Science?

Let us take a closer look at the two assumptions. We begin with the epistemological assumption that natural science by itself, and in a value-free way, can determine the limits we have to stay within in order to remain sustainable—that is, in order to leave similar resources for future generations to use. The best way to test the assumption is to see how well it works in the specific analysis of different kinds of resources.

Nonrenewable Resources

There are various kinds of resources. A basic distinction is the one between renewable and nonrenewable resources. In the first case the limit is set by the flow per unit of time; in the second case the limit is set by the total stock. The distinction is somewhat blurred, but we do not have to worry about that here.[7] Let us just stick to the well-known distinction, and begin with the nonrenewable resources. Can natural science tell us how much we can use in order to leave the "same amount and quality" for future generations? It does seem that we face a serious difficulty right from the start. If these resources are nonrenewable, and if human beings are going to stay on earth for a long time, how can we be entitled to use anything at all? As long as we do not know how much longer humans will exist (and even natural science cannot answer that question), we cannot set the limit. If we assume that there will be humans alive thousands and thousands of years from now, from the stated premises we will have to conclude that we cannot use anything at all—at least not relatively limited resources like fossil fuels. (We did not need much natural science to reach that conclusion.)

A bad start, indeed, but let us change the premises a little. Instead of talking about the "same amount and quality," let us make use of the Lockean proviso and say that there should be "enough and as good" left. In this case we have an extra opportunity: if we (now or within the foreseeable future) can fully replace a limited resource with another one, we are allowed to use all of the resource up. In this case, "enough" means enough until a substitute is found that is just as good. For instance, if there are other energy sources that are just as good as fossil fuels in every important respect, we are entitled to use the fossil fuels without disregarding future generations (at least as long as we are only talking about fossil fuels as a resource question).

Can we now leave it to the natural sciences to operationalize the concept of sustainability? Before we accept the offer, we should consider a couple of disturbing problems. The first problem is the word *good*, which is included in the Lockean proviso. If we are to avoid the discussion of values, what are we going to do with *good*? This is obviously one of those four-letter words we are told not to use. When we dropped the phrase "same amount and quality," the reason was that it imposed too many limitations, and we replaced it with "enough and as good," because this allowed us to make various substitutions. In each case, however, we will have to ask whether the substitute is good enough. This is a major problem.

Let us look at alternatives for fossil fuels, for instance. Which other energy sources would count as good enough? Is nuclear power good enough, even though we will be leaving radioactive waste, which will be potentially dangerous to human beings and other living creatures for thousands of years? Is hydraulic power good enough, even if we have to flood some beautiful or historically significant valleys and block the salmon pathways? Are windmills good enough, even though some people find that they disturb the scenery? Is natural science really capable of settling such issues on its own? Of course, it is not. There are obviously value questions involved of the kind, which were transported to the free scopes of individuals in the story of modern life.

A similar problem turns up when we try to estimate the total amount of nonrenewable resources. Figure 6.1 depicts the so-called McKelvey box, used by the U.S. Geological Survey (and many other geological institutions around the world) to classify resources. The disturbing issue is not only that there is much uncertainty about the total amount of a certain nonrenewable resource (the x-axis problem), but even more that the estimate depends on factors foreign to natural science (the y-axis problem). The question of how much can be used how quickly without disregarding future generations cannot be answered without answering a couple of other questions, which are difficult to deal with via the methods of natural science.

The estimates depend on two factors. First, there is a technological factor. When technology improves, more resources will be discovered

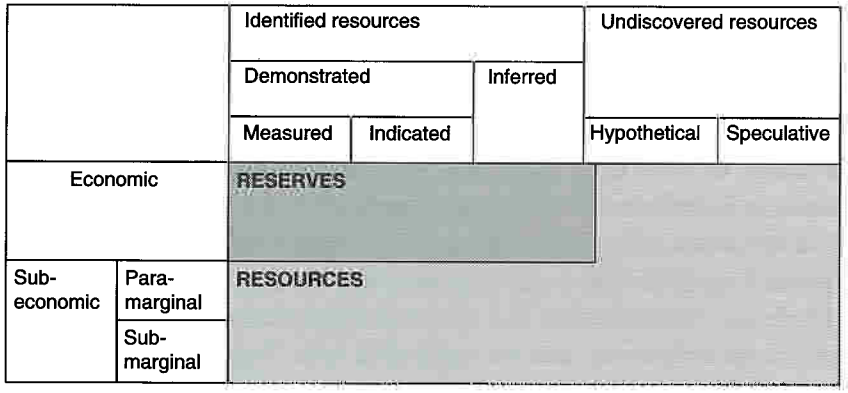

Figure 6.1
The McKelvey box, classifying mineral resources (U.S. Geological Survey/Bureau of Mines)

and more will become accessible. Estimates are made from a specific point in history, however, and it is impossible to predict future technological improvements. Second, there is an economic factor, or, to be more precise, a priority factor: some potential resources will never be used because they are too costly to extract and utilize. "Too costly" is an expression of estimates, however, which lies beyond the scope of natural science. These estimates have to be imported from types of discourse that lie beyond ordinary natural science. In the McKelvey box, the estimates are imported from economics. We will see later that this choice of conceptual framework can hardly be called accidental. Still, the basic point is that we are faced with weightings including value judgments, which cannot be arrived at using the ordinary methods of natural science.

Renewable Resources

Let us now turn to the renewable resources and see if natural science is able to do any better here. In contrast to the nonrenewable resources, it is not the total stock of resources that sets the limit, but the potential flow per unit of time. We cannot utilize more resources than those flowing through the system. We may thus be able to establish some general demands that should not be violated. First, the exploitation rate should never be higher than the regeneration rate. Forests should not be utilized beyond their net production, fish should not be caught more

quickly than the shoals can regenerate, and so on. Second, emissions should never be so great that the ecosystems receiving the emissions cannot neutralize them. CO_2 emissions should never exceed the sinks' absorption capacity; the release of nitrogen from agriculture should never exceed the denitrification rate, and so on. In economic terms, the capital stock should not be reduced, wherefore the rate of exploitation should never exceed the rate of regeneration, which can be compared with the rate of interest.

In some cases, however, we can move beyond the rate of regeneration for some time. We may, for instance, for a period of time catch more fish than the rate of reproduction seems to allow, as long as the shoal does not disappear altogether. For a number of years there will be fewer fish to catch—in other words, a smaller flow of resources—but the transgression of the regeneration rate is possible for a while. In other cases, unfortunate side effects may occur, but this does not make transgressions impossible. Eutrophication of lakes and watercourses results in unfortunate changes, but there is nothing absolute about this process. We can live with lower water quality, even if the salmon cannot. There are a few cases, of course, where we simply cannot move even temporarily beyond the limit. For instance, there is only so much solar energy coming in through the atmosphere, and we cannot possibly transgress the upper limit. We cannot live without the benefits solar energy brings us, and we cannot replace solar energy with anything else either. However, there are only a few similar cases (if any), and these cases do not seem to be among the most urgent ones.

Can natural science set limits here without making value judgments? The answer cannot be anything but negative. We will be facing exactly the same kinds of difficulties as in the case of nonrenewable resources. Some resources can be replaced, whereas tampering with others may lead to unfortunate consequences, but these unfortunate consequences are seldom so damaging that we cannot live with them. There are definitely some upper limits (we could not keep on living, for instance, if we were the only species left), but there are lots of reasons to react long before we even get close to such limits. Or, if the word *reasons* is not considered acceptable in relation to value, let us just say that there are enough value preferences around to motivate reactions long before we get even close to these absolute limits.

In figure 6.2, I have tried to present an overview of the different kinds of resources discussed above. In the entrances to the left I have separated nonrenewable resources from the two kinds of renewable resources. In the entrances at the top I have separated cases where the transgression of limits is impossible, no matter which values one subscribes to, from cases where replacement is possible with comparable alternatives, and cases where transgressions are unfortunate because of some foreseeable consequences. Some of the examples I have included in the figure could be placed in more than one room (there is, for instance, some upper limit on how much biodiversity can be reduced

		Transgression of limits absolutely impossible (value-free judgment)	Transgression possible through replacement by comparable alternatives	Transgression unfortunate (value assumptions)	
				Global/ international	Local
Nonrenewable resources —total amount (stock) decisive		e.g., arable land areas	e.g., fossil fuels, various metals and minerals	e.g., biodiversity (irreversible loss of species)	e.g., various local resources (irreversible losses of local nature qualities)
Renewable resources	Flow or capacity per unit of time decisive —problem even in case of temporary transgression	e.g., solar energy	e.g., various annual crops	e.g., protecting ozone layer (if CFC-gasses causes irreversible degradation)	e.g., watery ecosystems (where emissions of nitrogen causes eutrofication)
	Flow or capacity per unit of time decisive —only a problem if transgression is permanent	e.g., resilience and regeneration capacity in ecosystems, which are vital to survival of human beings	e.g., wood (exploitation of forests greater than net production)	e.g., atmospheric stability (greenhouse gas emissions larger than sinks)	e.g., clean water (emissions of pollutants larger than natural self-purifying capacity)

Figure 6.2
The possibility of transgression of limits in relation to the different kinds of resources

without putting the survival of our own species at risk), but this is only a minor problem. What I hope to show is that only a few resources have to be included in the column where the transgression of limits is absolutely impossible.

My conclusion is that it is not possible to "operationalize" the concept of sustainability by the use of natural science methods alone. There are too many value judgments involved. We may not be able to conclude in general that there is no way at all to operationalize the concept, but it seems obvious that it cannot be done by the ordinary methods of natural science.[8] There may be other possibilities, and I will deal with one of them below. Before I do that, though, let us take a look at the second assumption behind the idea of determining an ecological utilization space: the ethical assumption that the utilization space should be distributed on an equal basis.

Simple Equality as Distributive Criterion?

Simple equality is the criterion we use whenever we have no good reasons for making distinctions. This is the case with resources as well as with persons. If persons are considered simply to be persons as such, autonomous beings living a life in accordance with their own personal values, and nothing else, and if we are not allowed to judge which kind of life is most valuable, everybody must be treated as equals. As long as there are no common values or standards, we cannot discriminate between people. Similarly, if value judgments are not allowed to enter into the distributive scheme, all resources, together with potential resources, must be treated on an equal footing. If we cannot make judgments about the good (life) and its ingredients, it does seem quite reasonable to say that each and every kind of good or resource must be left for future generations in exactly the same amount as today. As soon as we say that it is more important to preserve one kind of resource over another, we make value claims of a kind that, according to the story of modern life, only belongs in the private sphere. Therefore, each person ought to have (access to) exactly the same amount as everybody else of every single kind of resource, which he or she is allowed to use in accordance with his or her personal values or private preferences.

Let us begin with the second premise, the equality of resources, which seems to be the easiest one to deal with. We do not have to think very far about consequences before we realize that it is quite absurd to claim that we should leave each and every kind of thing in exactly the same state and amount in order to be able to let future generations have (access to) exactly the same potential resource for their activities, not knowing which kinds of tastes the future will bring. First, it is simply impossible to fully comply with the claim. Natural changes inevitably occur that we cannot control, and we cannot even function ourselves if we are forced to keep everything in exactly the same state forever. We have no alternative but to give priority to the resources we consider most important, and to leave others in a state of constant change.

Second, when trying to establish priorities, we have to recognize that some resources, or potential resources, are simply too worthless to preserve, or even less desirable than that. Theoretically we could imagine a world, of course, where people would get a kick out of getting, say, malaria, or where it would be a status symbol to have chemical waste barrels piled up in the backyard. These scenarios are not likely, however, and I must confess that, like Avner de-Shalit,[9] I find it difficult to see myself committed to leaving those hypothetical individuals the necessary resources for their peculiar, unpredictable, and probably short-lived kind of lifestyle. There may be fewer tons of a specific kind of toxic bacteria in the world than there are of gold, but my hope and my guess is that future generations will be grateful to us for leaving them the gold, not the bacteria.

To avoid these absurd consequences without leaving the story of modern life with its demand for operationalization, we have to find a neutral way of dealing with valuations of resources. The solution usually chosen by people eager to operationalize sustainability is to let money become the common standard,[10] thus letting economics get in through the backdoor. I will return to some of the consequences of this approach in the next section.

Until then, let us return to the first of the two premises, the equal right of persons to the same amount of each and every resource, which they can use in accordance with their private conceptions of a good life. Is this a reasonable claim? First of all, it does not seem very sensible to give everybody exactly the same kinds of things, if they have different needs

and wants. I do not know what to do with my amount of plutonium, for instance, and I would rather not have it at all. I am not even sure that I would be able to do much with my shares of iron or mercury—apart from selling them, of course. I do have a garden, so I would like to have at least some of the earthworms, but if I were living in an apartment, I think I would feel better without them.

Second, in a dynamic society any initial distribution will soon be changed when people begin to use and exchange their resources in different ways. Some are hard-working people constantly trying to improve their lot and acquire more goods, whereas others prefer to have fewer material goods if this gives them more free time. Some have special talents that make it possible to get something extra out of their share, whereas others are less talented. Most people would probably exchange a large part of their resources with others, and these exchanges would almost automatically make some people's shares more valuable than those of others. It would, in principle, be possible to redistribute the resources, say, once a year, but it does not seem fair to those who have put great effort into maximizing their share just to transfer it to the lazy ones, nor does it seem reasonable to nullify all exchanges of resources once a year (they would then have to be repeated again after the redistribution). Moreover, these recurring redistributions would obviously contradict the idea behind the story of modern life, by restricting the long-term opportunities within individuals' private spheres.

To avoid such absurdities it seems necessary to make some changes in the equality claim. There are at least two possible strategies, if we want to keep on having the possibility of operationalizing sustainability. The first is to talk about communities instead of individuals. In this case, it is not future individuals who are entitled to the same amount and quality of resources as current individuals. Instead, it is future communities that are entitled to the same amount and quality as current communities. One of the advantages of talking about communities—nations, for instance—instead of individuals is that there will be a broader spectrum of preferences and needs, so that it is more likely that there will be some preferences and needs corresponding to each kind of resource. This way we also avoid futile discussions about how many people are going to exist in the future and who they will be. If it is communities we are talking about, it does not matter exactly how many people

they include, nor whether the individuals will be different when different decisions are made.[11] Furthermore, the choice of distributive criteria would be more open within each single generation: the simple equality criterion could be supplied with criteria like merit, needs, abilities, luck, and so on.[12]

One of the disadvantages, however, when seen from the standpoint of the story of modern life is that there is no guarantee that each individual will receive a share that can be considered equal, or at least equitable, as compared with those of others. In fact, there is an obvious problem of measuring equality: how are we to compare the relative value of different resources, if everybody has a unique set of preferences? This problem could be solved, though, if we changed the original claim and said that, instead of an equal share, the average future individual would only be entitled to an equal opportunity to have an average share. Another disadvantage is that the inevitable valuations—that is, the determination of what can be considered "enough and as good"—will have to be made on the communal level, if we choose to focus on the community only. But this would run counter to the story of modern life, which only allows private valuations.

Both these problems can be solved most easily, though, if we accept a second possible change in the equality claim: letting economics in through the backdoor again, and saying that all individuals should not have an equal right to the same amount of all the particular resources, but only an equal opportunity to obtain the same amount of generalized resources—that is, money, which they can exchange for whatever kinds of goods and services they prefer. This way of changing the claim is very much in line with the second part of the definition of ecological utilization space in the statement from the Danish government: "Everybody should have a chance to reach the level of material welfare that the [now: common] ecological utilization space and the technological capacity allow."[13] *Material welfare* can thus be interpreted as just another term for generalized resources, or money to spend. This can also be seen to be in line with the Wuppertal report, which recommends that the price system should be changed in a way that makes it possible to reflect the "true value" of environmental resources.[14] In a system where everything is valued at its "true price," there does not seem to be any need to preserve and distribute each and every resource separately.

In this case, the claim is that every individual now and in the future should have an equal opportunity to reach the same average level of material welfare—that is, to acquire the same amount of money (or economic value)—as the average person in the current generation. This does not imply anything like the utopian demand that every single person in the future should be granted the right to have and to keep the same amount of money as the average person of today, no matter what his or her priorities are, but only that average future individuals should have the same opportunities as current average individuals, leaving it up to them whether they are interested in taking advantage of these opportunities or not.

This is evidently a flexible clause that can be interpreted in quite a few ways, but one fairly obvious interpretation would be to combine both of the two previously described ways of changing the equality claim, and thus continue talking about communities as well as of economics. We are then left with the claim that the community as a whole should continue to be as well off economically as today (or maybe that the average future individual should have at least the same opportunity as current average individuals to obtain average portions of the common pie).[15] This way, however, the demand to operationalize the concept of sustainability turns into exactly the kind of claim that neoclassical welfare economists prefer. In the next section, I will consider where this will take us.

Letting Economics in

Some of the objections I have offered to the concept of ecological utilization space have also been stated in slightly different ways by various Danish (as well as many other) economists.[16] They draw the conclusion that this concept has little validity or utility, and that the notion of economic sustainability gives us a much better foundation for the operationalization of sustainability. This position seems to be playing an increasingly prominent role in the Danish debate, more so than I would have believed possible just a few years ago.[17] Thus, it seems necessary to take a closer look at the assumptions we will have to accept (or shall I say: buy), if we let neoclassical welfare economics in through the backdoor. As will be clear in the following paragraphs, these assumptions fit extremely well with the story of modern life.

Basically, as in the story of modern life, all goods are considered to be goods simply because they are useful for satisfying preferences. All values can be reduced to, or at least can be dealt with as if they are, expressions of private preferences or emotional stances of varying intensity.[18] People's preferences and emotional perceptions are revealed by the choices they make. Some people have a strong preference for coffee or the survival of the blue whale, others do not, and matters of preference, taste, and emotion cannot be discussed rationally but only recorded as matters of fact. Everybody seeks to obtain the greatest possible satisfaction of preferences, in accordance with a unique set of private emotions related to various conceptions of the good life.

Common decisions must accordingly be based on the assumption that the private consumer is sovereign in his or her choice of goods. Communities are best understood as collections of private individuals, and they do not have any independent goals apart from maximizing the satisfaction of preferences. If common decisions are to be rational, they must therefore be conceived of as optimal aggregations of private choices. Whichever social welfare function one prefers, it has to be based on individualistic assumptions: economists "generally assume consumer sovereignty. That is, each individual's utility . . . is determined by that person's own judgments, not the judgments of society more generally."[19] *Sustainability* therefore means leaving future generations "the option or the capacity to be as well off as we are," or "to leave behind a generalized capacity to create well-being"[20] (which future generations can make use of or not). We cannot be specific about exactly which goods to leave behind, because we do not know the tastes of future individuals, and we are not allowed to interfere with them—"it is none of our business."

The total quantity of goods is limited, however, and it is necessary to make choices and trade-offs. Everything has a price, and nothing has an infinite price. Nothing is so important, so useful in satisfying preferences, that it cannot be exchanged or replaced with something else: "Goods and services can be substituted for one another. If you don't eat one species of fish, you can eat another species of fish. Resources are, to use a favorite word of economists, *fungible* in a certain sense. They can take the place of each other. That is extremely important because it suggests that we do not owe to the future any particular thing. There is no specific object that the goal of sustainability, the obligation of sustainability, requires us to leave untouched."[21] All goods and resources can be replaced and will be replaced as soon as the price is right. A consensus exists among most economists, we are told, that lack of one resource in most—if not all—cases can be fully compensated for by the presence of other resources.[22] All kinds of natural and cultural "capital" must be dealt with on an equal basis.

The measuring rod for the value of all kinds of resources is economic value or money.[23] Natural and cultural capital are simply various kinds of exchangeable capital, and they can all be measured by the same denominator: the market price. This way comparability across resources and preferences is made possible. If the market mechanism is working freely without external interference, the market price is an expression of the average intensity of present preferences toward it, and therefore of the good's expected utility value, or preference satisfaction value. It is a completely neutral measure that operates in real life. It is not the economists who value the environment; it is the sovereign consumers themselves. In this sense the methods of economists appears to be completely free of value judgments: they only "observe that individuals have preferences . . . and that those preferences are held with varying degrees of intensity."[24]

The economic value of preferred goods that for some reason are not or cannot be exchanged on the market (so that the related preferences cannot be represented) has to be fixed methodologically—using "Willingness To Pay" or "Willingness To Accept" surveys or by examining the various indirect ways in which the goods can be said to be valued economically by private consumers (prevention costs, replacement costs, wage differences, property price effects, travel expenses, and so on).[25] This way the direct-use values, indirect-use values, option values, and existence values not registered directly on the market can be brought within the horizon of the private consumers—for example, by taxing goods and services that have a negative impact on these externalities. The right taxes (the so-called Pigovian optimum taxes) are those that reflect the true external costs best: "The purpose of economic evaluation is to reveal the true costs of using up scarce environmental resources. . . . Valuation is essential if the scale of the tax or the strength of the regulation is to be determined."[26] However, to obtain accurate, not

just virtual or indirectly estimated prices, ways of getting all goods into the market should be considered insofar as possible—for example, through privatizing goods that are still common property, or by issuing marketable pollution or utilization permits, marketable preservation bonds on threatened species and ecosystems, and so on.

Although various welfare functions can be described, most welfare economists would argue that common decisions should be oriented toward obtaining the greatest amount of utility, or preference satisfaction, or welfare as measured in economic terms. Or the decisions should comply with the Pareto or Kaldor/Hicks optimality principles—that is, all the projects should be promoted that can make somebody better off economically without making anybody else worse off, or, if some people do suffer a loss, it should, in principle, be possible to offer them economically appropriate compensation that does not eat up all of the extra benefit. Or they should comply with the principle behind Coase's theorem: in all situations with potentially conflicting interests, the one solution should be sought (through negotiation or otherwise) that gives all affected parties the greatest advantage and, in principle, nobody any disadvantages. If all goods and services were privatized, and all benefits and costs therefore had specified prices, the market would deal with this problem automatically. Consequently, there would be no significant differences between the various criteria.

There is yet another important feature connected to this way of operationalizing sustainability: future goods have to be discounted in accordance with the present market rate of interest. Otherwise suboptimal decisions will be made, giving inappropriate priority to projects that bring fewer economic benefits than the more profitable ones. Without discounting, environmental investments will replace other and more profitable investments to an unreasonable degree: "The criterion for optimal social and economic development is that the marginal total benefits from the different investments should be equal regardless of what the investments are aiming at. In other words, the social discount rate should be equal for all investments. . . . Discounting is necessary in order to compare costs and benefits at different time periods. Attempts to avoid discounting or to apply a different discount rate for climate measures [or other environmental investments] than for other investments will inevitably result in an inefficient policy."[27]

This is not simply a matter of pure time preference, putting higher value on current than on future preference satisfactions. This would run counter to the claim that everybody, now and in the future, should be considered as equals. The basic point is that future generations will be better off as well, if current generations invest in projects that yield the highest returns. If all goods were truly priced and discounted appropriately, *sustainability* would be just another word for "economic optimality." The main reason the average rate of interest is positive, in spite of the fact that nonrenewable resources are being used up, is that technology is improving, becoming more efficient, and giving access to new resources, so that future people can also be expected to become richer than the current generations. The combination of resources will be different, but the aggregated amount, measured in common equivalents, will be larger. It would therefore be irrational and inequitable for current generations to make sacrifices for the sake of future generations.

Operationalization Reconsidered

Can economy do the job of operationalizing sustainability in a neutral way? I have to admit that I have never met an economist who did not have any reservations at all about the use of economic calculation in relation to problems like, say, the increasing greenhouse effect—that is, problems stretching out not just a few decades, but centuries into the future. All the economists I have met tend to believe that these problems lie at the border of, or way beyond, the capacity of economic science, though they usually believe that economic analysis can enlighten certain aspects of the problem.

To illustrate the absurdities a straightforward economic analysis can end up with in long-range problematics, the Danish economist Alex Dubgaard has calculated how much the flooding of Denmark caused by an increased greenhouse effect 500 years from now would cost, when ordinary calculation methods are used (current valuations, current rate of interest, and so on). His result is that a fair compensation to future generations would be to make an investment on the order of $8 or the value of a fried chicken meal with potato chips—$8 for a country that people have been willing to die for.[28] One must be very fond of the economic paradigm if one cannot see any absurdity in this.

Consider another case where a resource fundamental to human survival—freshwater, for instance—is likely to disappear 500 years from now if a certain project is accepted. If current water prices, based on current preferences for (and availability of) water, are used in the calculations, the project would probably not have to be extremely profitable in order to pass the sustainability test. It does not seem to be too much of a consolation that when people begin to die from the water shortages, they will be extremely rich. The problems in this case are related to a problem inherent in the economic method: the lack of information about future values, preferences, and prices. A "true" calculation has to include all valuations, now and in the future. This is impossible, of course, but the use of current valuations will not even give us an approximately reliable account, if the circumstances are going to change as radically as the economists themselves expect when they discount the future. If future generations are really going to be as rich as the use of the current rate of interest suggests, one can easily imagine that their values and preferences will be quite different from those of current people. Judging from current trends, it seems quite likely, for example, that they will value environmental goods and unspoiled nature areas much more highly than is the case today.[29] The inclusion of such guesses about future preferences in the economic calculus would probably undermine its claim to scientific validity, however, and these guesses would definitely undermine its claim to be a necessary decision-making instrument. There seems little need for its calculations if all the basic valuations on which the calculations are based are totally hypothetical.

For these and similar reasons, most economists are hesitant when asked to make economic cost-benefit calculations that include valuations of goods and circumstances that will exist more than a couple of decades from now, especially when a large array of goods and activities needs to be included. It may be argued that the picture I am presenting is one of a strawperson or a scapegoat. Few economists appear ready to walk the plank and say that sustainability can be fully operationalized by economic methods. Most of them agree that there are at least some critical resources that lie beyond their own sphere of application—resources not exchangeable in the same way as the less critical kinds of goods.

Still, the conviction is widespread that it is necessary or appropriate to try to find some "objective" and "operational" measures and indicators of sustainability in relation to the critical resources—that is, measures and indicators independent of any conception of the good life. In cases where economists cannot meet the challenge, scientists step in instead. While economists continue to make calculations concerning exchangeable and replaceable resources, scientists look for "operational indicators" related to critical resources like the resilience or robustness of ecosystems, or the capacity of resistance in the human body. This way economists and natural scientists seem to be able to divide up the various kinds of resources between themselves—the exchangeable resources go to the economists, the critical ones to the natural scientists—and the definition of *sustainability* can continue to be neutral and avoid the pitfall of value judgments about the components of the good life.[30]

This line of argument is still not fully convincing, however. There seems to be an important omission. Take the flooding of Denmark again. This is not a problem of survival in a biological sense. The citizens can move somewhere else. As a country, Denmark is not a critical resource in the sense describe. Is it an exchangeable resource, then? Can the disappearance of a country really be fully compensated for in terms of money? Can countries be bought and sold as exchangeable resources? If the answer is negative, it seems that we have to take a third kind of resources into account. These resources are neither easily exchangeable nor critical in terms of survival. Let me call them "unique resources."[31]

Unique resources are resources so important to us in one way or another that their disappearance would cause a profound sense of loss and serious damage to our sense of who we are. They cannot easily be replaced by something else, nor bought and sold in an ordinary bargain, because they are loaded with meanings that are more or less crucial, not for our survival as biological creatures, but for our identity. These resources make up the cultural and natural heritage that is fundamental to the way we understand ourselves and that we are proud to pass on to our descendents. In a physical sense we can live without them, but we may be losing some basic part of ourselves once we begin to sell out.

Many economists would say that if the price is high enough, the unique resources will turn into exchangeable resources. There is some truth in this, of course, as long as there are enough comparable goods left or similar goods to buy instead. In Rome, for instance, the citizens are

forced to set priorities in preserving the relics of the past. The heritage of the ancient world is so extensive that not all of it can receive the care it deserves. People may even have to sacrifice part of their heritage in order to be able to afford the good life themselves. The past can sometimes be a too heavy burden to maintain, as Nietzsche pointed out in the second part of his socalled "untimely reflections".[32] If it hampers life, it may be necessary to release the burden.

However, the more sacrifices we are forced to make, the more disturbing our reactions are likely to be. We begin to realize that there are values we cannot sell without suffering an identity crisis, where we no longer seem to know who we really are and what is truly important to us. Goods and values exist that cannot be conceived of as mere means to the satisfaction of casual whims. Without these goods and values, we would lose the bedrock of our lives. If we have any sense of identity at all, there are things so important to us that we are willing to make major sacrifices for them, or, to put it more aptly, there are things we are willing to devote a significant part of our lives to, without first calculating whether this will bring us more money or satisfactions.[33]

In figure 6.3, I have tried to show the differences between the three kinds of resources. Exchangeable (or easily replaceable) resources are related to values that are "soft" in the sense that they are easier to do without than the hard-core values, to which the two other kinds of resources are related. Critical resources are basic in relation to hard-core values like physical health and survival, whereas the various kinds of unique resources are important in terms of identity. Critical resources like (sufficiently) clean water and air will be needed in all kinds of societies, while the unique resources tend to be more specifically related to a particular culture or tradition. This does not mean that they can only be understood and appreciated by a very local culture. The temples of the Acropolis, for instance, do have a specific significance to the people of Greece, but this does not prevent others from acknowledging their significance or from considering them an important part of the common heritage of Europe and of humankind as well.

There are areas of overlap between the three kinds of resources, of course. It is not completely obvious, for example, where and when clean water can be considered an exchangeable resource, and when it turns critical. For some people the critical line appears much earlier than for

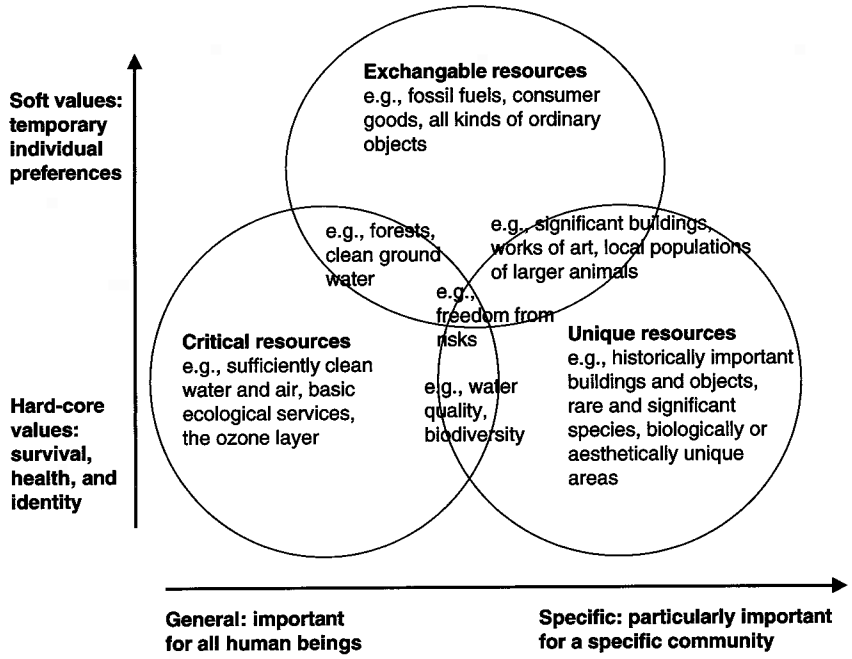

Figure 6.3
The three kinds of resources: exchangeable, critical, and unique

others. Similarly, the borderline between exchangeable and unique resources does not lie out there in the open, but can only be drawn by each community through political deliberation. Some communities are likely to let private individuals decide in most cases which part of a heritage to preserve, and only consider a few things worthy of attention from the entire community, whereas other communities tend to classify more things as unique resources that deserve to be preserved or taken care of by the community as a whole.

If we agree that there is a category of resources that are neither easily exchangeable nor crucial for our physical survival, two important things follow. First, we will have to move away from our interpretation of the sustainability demand as basically a negative claim, and adopt a more positive perspective. Sustainability no longer simply means that we have to restrain ourselves in order to leave an adequate legacy for our descendants. I will not deny, of course, that problems remain, which can best be described as conflicts of interest between current and future

generations, and where principles of distributive justice and equity in a fairly narrow sense are relevant. The introduction of unique resources into the sustainability debate does mean, however, that we have to move away from the kind of zero-sum game where a sustainability demand inevitably results in taking away some of the goods of current generations in order to give them to the following ones. Instead, sustainability is just as much a question of preserving and enhancing the goods and values that we ourselves are most devoted to. This includes taking a position on behalf of future generations, preserving or enhancing certain kinds of goods and resources before others, but isn't this actually a sign of true respect—trying to leave our descendants those parts of our cultural and natural heritage that we find most valuable in the sense that they are crucial to our understanding of who we are and of what we see as the basic values of life?[34]

Second, it will no longer be possible to operationalize sustainability through the use of more or less mechanical methods using value-free measures and indicators. The identification of unique resources can never be devoid of values, nor can disinterested parties determine them externally. These resources can only be recognized from within: you have to know (or discover) what you care most about in order to be able to identify it. I will not rule out the possibility of operationalizing certain features, once we have determined a specific set of basic goals, nor would I ever dream of denying that natural science as well as economics can make significant contributions to the goal-defining process. What I do deny is that the whole process can be left to one or another group of experts in operationalizing agencies, by the use of one or another predefined set of operational rules.

It is interesting to notice that the identification of unique resources often takes place parallel with, but usually quite independent from, the discussion of sustainability. This is what happens, for instance, in the Danish government's statements on environmental politics from 1995 and 1999. In chapter after chapter all the specific goals are set up for water and air quality, preservation of the cultural heritage in the city as well as in the landscape, protection of endangered species and habitats, and so on. Only in a few cases are we talking about truly critical resources, where survival is at stake, and the reason why goals are defined in the first place by the community's political representatives is that the

relevant features are not conceived of as resources that can be exchanged on the market. The specified goals are first of all goals concerning unique resources that the community has agreed on through a deliberative process. Still, the claim to operationalize sustainability is put forward almost as if these chapters were nonexistent.[35]

The Story of Modern Life Reconsidered

If it is true that such unique resources exist, we will have to make revisions in the story of modern life. Individuals can no longer be described exclusively in terms of their personal preferences, nor can we see the role of government agencies simply as that of ensuring that individuals are able to satisfy these preferences. We have to find a place for identity as a more stable element in life than the ever-changing preferences.

I find it difficult not to closely associate the questions of identity with the presence of a community. When we grow up as individuals we always do it as part of a community. Our identity, the way we understand ourselves, the conceptional resources we use when we try to come to terms with the various ingredients of the good life—all of these things originate from a communal source. No matter how one chooses to define it, no community is without factions, of course, and as we grow older we all end up with a unique combination of values and preferences. But still, we cannot understand ourselves without the conceptual and behavioral resources we have inherited from the community. We share our most basic traditions with those around us.

Does this mean that we have to skip the whole story of modern life, and let go of the theme of individualism? Not at all, but we have to realize that the story's conception of individuals is much too one-sided. It cannot tell the whole truth if it ignores the communal side and only informs us about the private dimension. It becomes one-sided, too, when it focuses only on a limited range of individual rights. To the extent that it is concerned only with the individual, it can only consider the rights to a private sphere of activity. It is unable to see individuals as citizens with the right to participate in deliberations about common affairs. Thus the concept of autonomy becomes one-sided as well.[36] The only place autonomy is sought is in the private sphere, whereas the political sphere is either deserted or occupied and taken over by "experts" trying to

specify the demands of sustainability through predefined methods. No allowance is made for shared values, and definitely not for common decisions about the good life. These are very strong limitations placed on our personal autonomy, and they are extremely difficult to reconcile with claims of neutrality.

Even though the way we see our identity is intimately connected to our community and cultural traditions, it can never be conceived as one seamless web. The individual can never disappear and become one with its community. This is why the story of modern life is still worth telling, provided that it takes all sides into account. The individual needs protection, not only in order to be in control of his or her own private life, but also in order to be able to contribute to the communal life. If we had to get to the bottom line, this is probably what sustainability in a modern society would be about at its very deepest level: the protection and continuation of a democratic process where individuals can participate in communal affairs without having to give up much personal autonomy. However, their lives will certainly be richer if they can also inherit not only the necessary critical resources and an equitable amount of exchangeable resources, but also the unique resources deemed most precious by their ancestors. At the end of the day, future generations may not place the same priority on the resources we consider most valuable, but our legacy to them may still give them a stronger foundation for the creation of their own version of the good life.

Notes

1. R. Weterings and J. B. Opshoor, *The Ecocapacity as a Challenge to Technological Development*, Publikatie RMNO no 74A (Rijswijk: Advisory Council for Research on Nature and Environment, 1992).

2. Mathis Wackernagel, *How Big Is Our Ecological Footprint?* Draft (Vancouver: The UBC Task Force on Healthy and Sustainable Communities 1993); William E. Rees and Mathis Wackernagel, *Our Ecological Footprint: Reducing Human Impact on the Earth* (Philadelphia: New Society Publishers, 1996).

3. *Mod et bæredygtigt Europa* [Toward a sustainable Europe], report from the Wuppertal Institute (Copenhagen: NOAH/Friends of the Earth Denmark, 1996), 11.

4. *Natur- og miljøpolitisk redegørelse 1995* [Statement on nature and environmental policy 1995] (Copenhagen: Danish Ministry of Environment and Energy, 1995), 27. In the English summary of this statement (*Denmark's Nature and Environment Policy 1995: Summary Report* (Copenhagen: Danish Ministry of Environment and Energy, 1995)), the presentation of the ecological utilization space (or ecological scope) is much more vague than in the full statement.

5. *Natur- og miljøpolitisk redegørelse 1995*, 57.

6. *Mod et bæredygtigt Europa*, 9.

7. First, some of the nonrenewable resources can be reused over and over again. There is a limit, though, in that there will always be a certain loss of the resource every time it is recycled. It may not disappear altogether, but it will be dispersed in the environment in tiny amounts, which cannot be brought back into the recycling process—at least not without using a disproportionately large amount of energy. Second, some resources considered renewable may actually be used up. Clean water, for instance, is a renewable resource as long as there is enough of it, and as long as it stays clean. If it is used too quickly, there may be nothing left, and if it is heavily polluted, it may no longer be useful—at least not for a considerable amount of time. Similarly, when a desert is spreading, the renewable resources that used to be there—the trees and shrubs, for example—may not be able to regenerate. Or, to take one last example, an endangered species is renewable; if it becomes extinct, it is not.

8. Similar conclusion were reached in a report sponsored by the Danish Ministry of Environment and Energy (*Økologisk råderum—en sammenfatning* [Ecological Utilization Space—Project Summary], Miljøprojekt no. 433 (Copenhagen: Danish Ministry of Environment and Energy, 1998)), as well as in the Netherlands Scientific Council for Government Policy's evaluation of the use of the notion of "environmental utilization space" in Dutch environmental policy (*Sustained Risks: A Lasting Phenomenon* Report to the Government no. 44 (The Hague: Netherlands Scientific Council for Government Policy, 1995)). (I thank Robin Attfield for bringing the Dutch report to my attention.)

9. Avner de-Shalit, *Why Posterity Matters* (London: Routledge, 1995).

10. This is not just the case in the sustainability debate, of course. For instance, the first thing Ronald Dworkin does in his discussion of equality of resources is to let the inhabitants of his thought experiment—the survivors of a shipwreck, washed up on a desert island—invent local money and set prices on all goods at an auction (Ronald Dworkin, "What Is Equality? Part 2, Equality of Resources," *Philosophy and Public Affairs* 10, no. 4 (1981): 283–345). Instead of money, one could use "manna," like Bruce Ackerman, or some other kind of apparently neutral utility chip.

11. Thus we avoid Derek Parfit's Non-Identity Problem, as well as the Repugnant and other Counter-intuitive Conclusions, and so on; see Derek Parfit, *Reasons and Persons*, 3rd ed. (Oxford: Clarendon Press, 1987).

12. See also Andrew Dobson, *Justice and the Environment: Conceptions of Environmental Sustainability and Dimensions of Social Justice* (Oxford: Oxford University Press, 1998), 130.

13. *Natur- og miljøpolitisk redegørelse 1995*, 27.

14. *Mod et bæredygtigt Europa*, 10.

15. This interpretation does lend itself to counterintuitive conclusions like increasing the average income opportunities by decreasing the number of people, or increasing the total income opportunities by increasing the number of people. I will leave these problems aside here, however. (See also John Broome, *Counting the Costs of Global Warming* (Cambridge: White Horse Press, 1992), chap. 4.)

16. Thus, for instance, J. Munksgaard and A. Larsen, "Miljømæssigt råderum—et vildskud? [Environmental utilization space—An aberration?]," *Samfundsøkonomen* 1999, 1.

17. In the latest governmental statement on Danish environmental policy, *Natur- og miljøpolitisk redegørelse 1999*, the 1995 definition of the ecological utilization space is quoted in a chapter on sustainability, but this time alongside an exposition of the concept of economical sustainability (or weak sustainability) taken over from a exposition made by the Danish Economic Council (an independent agency staffed by economic experts and sponsored by the government): "Bæredygtighed, Balance mellem generationer" [Sustainability: Balance between Generations], in *Dansk økonomi* (Copenhagen: Det økonomiske Råd, 1998), 171–256. The statement does not make clear which of the two concepts the government was planning to use as its primary guideline (*Natur- og miljøpolitisk redegørelse 1999* (Copenhagen: Danish Ministry of Environment and Energy, August 1999), chap. 36, 503ff). In a governmental proposal outlining a strategy for sustainable development, made in the summer of 2001 by the social democratic/social liberal government and intended to be presented at the Rio + 10 World Summit in Johannesburg 2002 (*Udvikling med omtanke—fælles ansvar* [Development with Care—Common Responsibility] (Copenhagen: Miljøstyrelsen, June 2001)), all references to the concept of "ecological utilization space" (or "environmental space") were removed, whereas the economists' concept of "true savings" (measured in terms of economic value) was given a more prominent position as a main indicator of sustainability. The use of economic concepts and measures is even more prominent in the new liberalist/conservative government's revision of the former government's proposal (*Fælles fremtid—udvikling i balance* [Common Future—Balanced Development] (Copenhagen: Miljøstyrelsen, April 2001)).

18. For a description of the growing formalization and subjectivization of the concepts of "utility" and "well-being" in modern economic debate, see John O'Neill, *The Market: Ethics, Knowledge and Politics* (London: Routledge, 1998), esp. chap. 3.

19. Kenneth J. Arrow et al., "Intertemporal Equity, Discounting, and Economic Efficiency," in *Climate Change 1995: Economic and Social Dimensions of Climate Change*, ed. James P. Bruce, Hoesung Lee, and Erik F. Haites (Cambridge: Cambridge University Press, 1995), 142n18 (see also p. 138).

20. Robert M. Solow, "Sustainability: An Economist's Perspective," in *Economics of the Environment: Selected Readings*, ed. Robert Dorfman and Nancy S. Dorfman (New York: Norton, 1993), 181, 182. A similar definition can be found in David Pearce, *Environmental Values and the Natural World* (London: Earthscan, 1993), 48, 55f, as well as in many other similar books and articles.

21. Solow, "Sustainability," 181.

22. Arrow et al., "Intertemporal Equity, Discounting, and Economic Efficiency," 140, 141n6.

23. Pearce, *Environmental Values and the Natural World*, 50. Some economists do say that this is only true up to some point, where trade-offs between cultural and natural capital cannot be continued, because some fundamental natural services would be irreversibly damaged (for example, David Pearce and R. Kerry Turner, *Economics of Natural Resources and the Environment* (New York: Harvester Wheatsheaf, 1990), 24f, 56f). Others would argue that there is no limit that cannot be seen from the market if everything is priced properly.

24. Pearce, *Environmental Values and the Natural World*, ix.

25. A couple of good overviews of these valuation techniques can be found in Pearce, *Environmental Values and the Natural World*, appendix II, and in David Pearce and Dominic Moran, *The Economic Value of Biodiversity* (London: Earthscan, 1994), chap. 5.

26. Pearce, *Environmental Values and the Natural World*, 5.

27. M. Munasinghe et al., "Applicability of Techniques of Cost-Benefit Analysis to Climate Change," in *Climate Change 1995: Economic and Social Dimensions of Climate Change*, ed. James P. Bruce, Hoesung Lee, and Erik F. Haites (Cambridge: Cambridge University Press, 1995) 166. The question of discounting is a matter of much controversy, of course, and many economists do argue that the discount rate should be reduced to zero, whenever the time horizon lies beyond a couple of decades. A good overview of the arguments for and against the use of positive discount rates can be found in John Broome, *Counting the Costs of Global Warming* (Cambridge: White Horse Press, 1992), chap. 3.

28. Alex Dubgaard, "Bæredygtighed og forsigtighedsprincippet" [Sustainability and the principle of precaution], in *Fremtidens pris. Talmagi i miljøpolitikken* [The price of the future: Number magic in environmental policy], ed. Henning Schroll et al. (Copenhagen: Mellemfolkeligt Samvirke/Det Økologiske Råd, 1999), 291. Similar illustrative examples of the absurdities of economic calculations when driven outside a fairly narrow scope can be found, for instance, in C. W. Clark's famous article about the economic sense in killing all blue whales in the ocean and transferring the profits to growth industries (C. W. Clark, "Profit Maximization and the Extinction of Animal Species," *Journal of Political Economy* 81 (1973): 950–961), and in Peter Wenz's calculation that discounting at a 5 percent rate would make one life today worth more than 16 billion lives in less than 500 years (Peter Wenz, *Environmental Justice* (Albany, NY: SUNY Press, 1988), 230).

29. Alan Holland has referred to this as a "Cambridge change"; although nothing has happened to an area, its exchange value may change radically, or, conversely, although the aggregated exchange value of unspoiled nature areas is not diminishing, the areas in themselves may be changing in the most radical

way (Alan Holland, "Sustainability: Should We Start from Here?", in *Fairness and Futurity*, ed. Andrew Dobson (Oxford: Oxford University Press, 1999), 57f).

30. See Herman Daly and John Cobb's point that the identification of "carrying capacity," which determines the maximal and optimal volume of economic activity, measured in physical units, is a job for the biophysical sciences, whereas the job of the economists is to suggest taxes and other kinds of regulations of the market in order to keep the activity at its "optimal volume" (Herman E. Daly and John B. Cobb, Jr., *For the Common Good* (Boston: Beacon Press, 1989), chap. 7). A similar point is made in the Danish Ministry's previously mentioned exposition (*Natur- og miljøpolitisk redegørelse 1999*, 515).

31. Holland has made a similar point: "There are human-made features for which there are no natural substitutes, and probably some for which there are no other human-made substitutes either" (Holland, "Sustainability," 53).

32. Friedrich Nietzsche, "Unzeitgemässe Betrachtungen, Zweites Stück, Vom Nutzen und Nachtheil der Historie für das Leben" (1874), in *Werke I*, ed. K. Schlechta (Frankfurt am Main: Ullstein 1976).

33. See also Michael Sandel's point against "purely preferential choice": "In consulting my preferences, I have not only to weigh their intensity but also to assess their suitability to the person I (already) am. I ask, as I deliberate, not only what I really want but who I really am, and this last question takes me beyond an attention to my desires alone to reflect on my identity itself. . . . While the notion of constitutive attachments may at first seem an obstacle to agency—the self, now encumbered, is no longer strictly prior—some relative fixity of character appears essential to prevent the lapse into arbitrariness which the deontological self is unable to avoid" (Michael J. Sandel, *Liberalism and the Limits of Justice* (Cambridge: Cambridge University Press, 1982), 180). I have discussed this point further in "Levn, levninger og brugt natur. Om forpligtelsen over for eftertiden" [Relics, remnants, and used nature: On the responsibility toward posterity], in *Naturminder—levnenes betydninger i tid og rum* [Nature memorials—The significance of relics in time and space], eds J. Guldberg and M. Ranum (Odense: Odense University Press, 1997).

34. See Avner de-Shalit's point that in order to do justice to future generations "we need not know the preferences of future people at all, but, rather, can decide what to leave to future generations on the basis of our own values" (Avner de-Shalit, *Why Posterity Matters: Environmental Politics and Future Generations* (London: Routledge, 1995), 130). A similar point has been put forward by Mark Sagoff: "We cannot avoid paternalism with respect to future generations. . . . We want them to have what is worthy of happiness. We want to be able to respect them and to merit their good opinion. How may we do this except by identifying what is best in our world and trying to preserve it? How may we do this except by determining, as well as we can, what is worth saving, and then by assuming that this is what they will want?" (Mark Sagoff, *The Economy of the Earth: Philosophy, Law, and the Environment* (Cambridge: Cambridge University Press, 1988), 63ff).

35. Even though the Danish governments' proposals for a strategy for sustainable development put much focus on the economically defined concept of "true savings" (see note 17), they also stress the need to involve other measures. The following sentence appears on page 3 in the former as well as in the new government's proposals: "We shall avoid critical effects on environment, nature and health, and we shall protect and preserve special and unique natural values, which cannot be regenerated if they disappear." Formulations like these indicate that the strategy is best understood as a compromise between one position, represented by the Danish Economic Council with its focus on "true savings" in economical terms (see note 17), and another position, until recently represented by the counterpart, the so-called Nature Council (Naturrådet), which is more oriented toward the critical and unique resources (Naturrådet, *Dansk naturpolitik. Visioner og anbefalinger* [Danish Nature Politics: Visions and Recommendations], (Copenhagen: Naturrådet, 2000)). However, the new liberalist/conservative government has recently abolished the Nature Council and set up a new (economic) environmental evaluation agency with the "skeptical environmentalist" Bjørn Lomborg as director, so the balance has changed now in favor of an economic position with a more positive view on the replacement of resources.

36. See also the discussion of autonomy and the necessary combination of liberal, republican, and procedural rights in Jürgen Habermas, *Faktizität und Geltung* (Frankfurt am Main: Suhrkamp, 1992).